METHODS AND FORMULATIONS FOR PROTECTING CELLS, AND FOR TREATING DISEASES AND CONDITIONS BY OPTIMIZING THE INTRACELLULAR CONCENTRATION OF NAD

What is claimed is:

1. A method for treating diseases or conditions in an animal, said method comprising the step of optimizing the intracellular concentration of PBEF in the cells of at least one target tissue of said animal.

2. The method of claim 1, wherein said optimizing of said concentration of PBEF is effected by increasing the intracellular concentration of said PBEF of said animal a sufficient amount of PBEF.

3. The method of claim 1, wherein said optimizing of said concentration of PBEF is effected by administering to said animal a sufficient amount of PBEF to increase the intracellular concentration of said PBEF.

4. The method of claim 3, wherein said administering of PBEF is by at least one route, and said at least one route is one or more of injection, oral administration, anal or other colonic administration, inhalation, intra-peritoneal administration, topical administration, intra-organ administration, infusion of a target tissue, transdermal and parenteral administration, including intravenous, intraperitoneal, subcutaneous, intramuscular, trans-epithelial, nasal, intrapulmonary, intrathecal, rectal and topical modes of administration.

5. The method of claim 3, wherein said administering of PBEF is by at least one route, and said at least one route is one or more of the methods of gene therapy, including the use of one or more viral vectors.

6. The method of claim 3, wherein said one or more viral vectors are chosen from the group comprising adenoviruses, lentiviruses, adeno-associated viruses and non viral plasmid vectors.

7. The method of claim 3, wherein said increasing of said PBEF is effected by promoting the endogenous production of PBEF in the cells of at least one target tissue of said animal.

8. The method of claim 7, wherein said promotion of intracellular production of PBEF is effected by up-regulating the nucleic acid processes which support the production of PBEF.

9. The method of claim 7, wherein said promotion of intracellular production of PBEF is effected by up-regulating the nucleic acid processes which increase the endogenous production of PBEF.

10. The method of claim 7, wherein said promotion of intracellular production of PBEF is effected by down-regulating the nucleic acid processes which repress the production of PBEF.

11. The method of claim 1, wherein said optimization of PBEF is effected by increasing the intracellular concentration of at least one modulator of PBEF.

12. The method of claim 11, wherein said optimization of PBEF is effected by administering to said animal an effective amount of said modulator.

13. The method of claim 11, wherein said administering of said modulator is by at least one route, and said at least one route is one or more of injection, oral administration, anal or other colonic administration, inhalation, intra-peritoneal administration, topical administration, intra-organ administration, infusion of a target tissue, transdermal and parenteral administration, including intravenous, intraperitoneal, subcutaneous, intramuscular, trans-epithelial, nasal, intrapulmonary, intrathecal, rectal and topical modes of administration.

14. The method of claim 11, wherein said modulator is PRPP.

15. The method of claim 11, wherein said increase of PBEF is effected by promoting the endogenous production of PRPP in the cells of at least one target tissue of said animal.

16. The method of claim 14, wherein said promotion of intracellular production of PBEF is effected by up-regulating the nucleic acid processes which increase the production of PRPP.

17. The method of claim 14, wherein said promotion of intracellular production of PBEF is effected by down-regulating the nucleic acid processes which repress the production of PRPP.

18. The method of claim 14, wherein PRPP can be given in combination with at least one form of nicotinamide.

19. The method of claim 18, wherein said nicotinamide may be substituted or in the form of one or more of nicotinic acid; nicotinic acid ribonucleotide; nicotinic acid ribonucleotide, reduced form; nicotinamide ribonucleotide; nicotinamide ribonucleotide, reduced form; nicotinic acid adenine dinucleotide; nicotinic acid adenine dinucleotide, reduced form; nicotinamide adenine dinucleotide (NAD); nicotinamide adenine dinucleotide phosphate (NADP); nicotinamide adenine dinucleotide, reduced form (NADH); and nicotinamide adenine dinucleotide phosphate, reduced form (NADPH) and pharmaceutically acceptable salts thereof.

20. The method of claim 1, wherein said disease or condition is a vascular disease of one or more of the heart, blood vessels and other portions of the cardiovascular system

21. The method of claim 1, wherein said disease or condition is one or more of vascular insufficiency, vascular weakness, progeria, premature senescence of one or more tissues, aging, severe stress on one or more tissues, atherosclerosis, arteriolesclerosis and re-vascularization of injured or weakened tissues or organs.

22. The method of claim 1, wherein said severe stress on one or more tissue is due to one or more of injury, malnutrition, disease, toxic shock and exposure.

23. The method of claim 1, wherein said optimization of PBEF is effected by increasing the intracellular concentration of at least one precursor of PBEF.

24. The method of claim 23, wherein said increase of PBEF is effected by administering to said animal an effective amount of said precursor.

25. The method of claim 23, wherein said administering of said precursor is by at least one route, and said at least one route is one or more of injection, oral administration, anal or other colonic administration, inhalation, intra-peritoneal administration, topical administration, intra-organ administration, infusion of a target tissue, transdermal and parenteral administration, including intravenous, intraperitoneal, subcutaneous, intramuscular, trans-epithelial, nasal, intrapulmonary, intrathecal, rectal and topical modes of administration.

26. The method of claim 23, wherein said precursor is at least one form of nicotinamide.

27. The method of claim 26, wherein said nicotinamide may be substituted or in the form of one or more of nicotinic acid; nicotinic acid ribonucleotide; nicotinic acid ribonucleotide, reduced form; nicotinamide ribonucleotide; nicotinamide ribonucleotide, reduced form; nicotinic acid adenine dinucleotide; nicotinic acid adenine dinucleotide, reduced form; nicotinamide adenine dinucleotide (NAD); nicotinamide adenine dinucleotide phosphate (NADP); nicotinamide adenine dinucleotide, reduced form (NADH); and nicotinamide adenine dinucleotide phosphate, reduced form (NADPH) and pharmaceutically acceptable salts thereof.

28. The method of claim 1, wherein said animal is a human.

29. A composition for optimizing the intracellular concentration of NAD, said composition comprising an effective amount of PBEF.

30. The composition of claim 29, further comprising an effective amount of PRPP.

31. The composition of claim 30, further comprising an effective amount of nicotinamide.

32. The composition of claim 29, further comprising an effective amount of nicotinamide.

33. The composition of claim 32, wherein said nicotinamide may be substituted or in the form of one or more of nicotinic acid; nicotinic acid ribonucleotide; nicotinic acid ribonucleotide, reduced form; nicotinamide ribonucleotide; nicotinamide ribonucleotide, reduced form; nicotinic acid adenine dinucleotide; nicotinic acid adenine dinucleotide, reduced form; nicotinamide adenine dinucleotide (NAD); nicotinamide adenine dinucleotide phosphate (NADP); nicotinamide adenine dinucleotide, reduced form (NADH); and nicotinamide adenine dinucleotide phosphate, reduced form (NADPH) and pharmaceutically acceptable salts thereof.

34. The composition of claim 30, further comprising one or more of an effective amount of a pharmaceutically effective vehicle, a pharmaceutically effective diluent, a pharmaceutically effective cream, a pharmaceutically effective excipient, one or more pharmaceutically effective micelles, a pharmaceutically effective carrier, pharmaceutically acceptable concentrations of salt, buffering agents, preservatives and various compatible carriers.

35. The composition of claim 30, wherein said composition is adaptable for administration by at least one route, and said at least one route is one or more of injection, oral administration, anal or other colonic administration, inhalation, intra-peritoneal administration, topical administration, intra-organ administration, infusion of a target tissue, transdermal and parenteral administration, including intravenous, intraperitoneal, subcutaneous, intramuscular, trans-epithelial, nasal, intrapulmonary, intrathecal, rectal and topical modes of administration.

36. The composition of claim 29, wherein said composition is provided in the form of one or more of ingestible tablets, buccal tablets, troches, capsules, elixirs,

suspensions, micelle encapsulations, syrups, wafers and the like, or enclosed or enclosable within hard or soft shell gelatin capsules.

37. The composition of claim 29, further comprising one or more of an effective amount of a cosmetically effective vehicle, a cosmetically effective diluent, a cosmetically effective cream, a cosmetically effective excipient, one or more cosmetically effective micelles, a cosmetically effective carrier, cosmetically acceptable concentrations of salt, buffering agents, preservatives and various cosmetically compatible carriers.

38. A composition for optimizing the intracellular concentration of NAD, said composition comprising an effective amount of PRPP.

39. The composition of claim 38, further comprising an effective amount of PBEF.

40. The composition of claim 39, further comprising an effective amount of nicotinamide.

41. The composition of claim 38, further comprising an effective amount of nicotinamide.

42. The composition of claim 41, wherein said nicotinamide may be substituted or in the form of one or more of nicotinic acid; nicotinic acid ribonucleotide; nicotinic acid ribonucleotide, reduced form; nicotinamide ribonucleotide; nicotinamide ribonucleotide, reduced form; nicotinic acid adenine dinucleotide; nicotinic acid adenine dinucleotide, reduced form; nicotinamide adenine dinucleotide (NAD); nicotinamide adenine dinucleotide phosphate (NADP); nicotinamide adenine dinucleotide, reduced form (NADH); and nicotinamide adenine dinucleotide phosphate, reduced form (NADPH) and pharmaceutically acceptable salts thereof.

43. The composition of claim 39, further comprising one or more of an effective amount of a pharmaceutically effective vehicle, a pharmaceutically effective diluent, a pharmaceutically effective cream, a pharmaceutically effective excipient, one or more pharmaceutically effective micelles, a pharmaceutically effective carrier,

pharmaceutically acceptable concentrations of salt, buffering agents, preservatives and various compatible carriers.

44. The composition of claim 39, wherein said composition is adaptable for administration by at least one route, and said at least one route is one or more of injection, oral administration, anal or other colonic administration, inhalation, intra-peritoneal administration, topical administration, intra-organ administration, infusion of a target tissue, transdermal and parenteral administration, including intravenous, intraperitoneal, subcutaneous, intramuscular, trans-epithelial, nasal, intrapulmonary, intrathecal, rectal and topical modes of administration.

45. The composition of claim 38, wherein said composition is provided in the form of one or more of ingestible tablets, buccal tablets, troches, capsules, elixirs, suspensions, micelle encapsulations, syrups, wafers and the like, or enclosed or enclosable within hard or soft shell gelatin capsules.

46. The composition of claim 38, further comprising one or more of an effective amount of a cosmetically effective vehicle, a cosmetically effective diluent, a cosmetically effective cream, a cosmetically effective excipient, one or more cosmetically effective micelles, a cosmetically effective carrier, cosmetically acceptable concentrations of salt, buffering agents, preservatives and various cosmetically compatible carriers.